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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
WOODS, ERIC V	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/071,670	KELLMAN ET AL.	
	Examiner	Art Unit	
	Eric Woods	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 February 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-8,12,13,26-29 and 38-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-8,12,13,26-29 and 38-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/15/2007 has been entered.

Response to Arguments

Applicant's arguments, see Remarks and claim amendments, filed 2/15/2007, with respect to the rejection(s) of all claim(s) under various statutes have been fully considered and are persuasive.

Therefore, in view of applicant's amendments, the rejection of claims 12 and 42-44 under 35 USC 112 has been withdrawn.

The objection to claim 13 stands withdrawn in view of applicant's amendment.

The rejection of claims 5-8, 12-13, 26-29, and 39-44 under 35 USC 103(a) stands withdrawn in view of applicant's amendment to the claims.

Claims 45-48 were added.

However, upon further consideration, a new ground(s) of rejection is made in view of various references against all claims as below.

Since all rejections have been withdrawn, applicant's arguments are moot in view of the new grounds of rejection.

In rebuttal to applicant's remarks about the Hancock reference only providing relative altitude information, examiner is using it as a linking reference to convey the importance of providing information via visual redundancy along with a teaching that such redundancy has been used before with at least application to **relative** altitude. It is an easy step to logically and obviously apply techniques previously used for visualizations of a quantity relative to one object to the visualization of the absolute version of that quantity with respect to another.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 5-8, 12-13, 26-29, and 39-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Azuma et al ("Visualization Tools for Free Flight Air-Traffic Management") in view of Hancock (US 5,179,377) and Nowell ("Graphical Encoding for

Information Visualization: Using Icon Color, Shape, and Size to Convey Nominal and Quantitative Data." Lucille Terry Nowell)

As to claim 12,

A system for conveying aircraft altitude to a human observer, comprising: (Azuma Figures 3 and 4, shown on a display device)

-A processor receiving latitude, longitude, and altitude information relating to an aircraft, wherein the altitude information corresponding to an altitude of the aircraft relative to a geographic reference, (Azuma teaches processor in the form of a SGI Onyx with 4 R10K CPUs on page 34, lower left column. Azuma teaches that the system receives such 3D coordinate information (e.g. page 33, "All aircraft are tracked with an augmented GPS, such as the Wide Area Augmentation System (WAAS), and broadcast their positions and intended routes...via a data link such as ADS-B", and the altitude information is provided with respect to a geographic reference, e.g. sea level and/or airport altitude)

-Wherein the processor determines, based on the altitude information, a shape for an icon representing the aircraft, wherein the shape is indicative of the altitude of the aircraft relative to the geographic reference; and (Azuma teaches a processor that converts that altitude information of the of the system to an icon that has changes color in response to the altitude information, e.g. page 34, upper right column, "Aircraft icons are colored based on direction and latitude. Eastbound aircraft are orange, and westbound aircraft are blue, with lighter hues indicating higher altitudes.")

-A display in operable communication with the processor, the display providing a two-dimensional planar view and having a first axis representing latitude and a second axis representing longitude, wherein the processor directs the display to present the icon at a position on the display indicative of the latitude and longitude of the aircraft, wherein the shape of the displayed icon is indicative of the altitude of the aircraft relative to the geographic reference and wherein the processor directs the display to change the shape of the icon in response to a change in the altitude information. (Azuma teaches display devices on page 34, lower left column, where such is obviously coupled to the display device since it displays the output. In Figures 3-4, the aircraft are represented as icons having the recited latitude and longitude positions, where the icon changes color in a manner indicative of the attitude of the aircraft.)

Azuma teaches most of the limitations of the instant claim but fails to teach changing the shape of the icon in a manner indicative of the received altitude. The Hancock reference clearly teaches that icons are changed in size and shape (e.g. overlaid threat symbol) with respect to each other when they are close to each other (e.g. the distance between the aircraft is sufficient to cause a traffic and/or resolution advisory) – see Hancock, Figures 1 and 2 – the icon size is clearly changed as the differential altitude changes –see 2:50-55, 3:35-50). The Hancock reference further teaches that it is advisable to have redundant coding (e.g. different color, size, and overlaid threat symbol) for an icon representing the aircraft. Note that Hancock clearly teaches that the size of the icon varies with respect to differential altitude (4:6-35 for

Figure 2, with the icon size varying with the relative location of other planes to the present location of the aircraft). See also Abstract.

Hancock also teaches overlaying different threat symbol classes on aircraft (e.g. 4:65-5:12) based on their altitude and/or distance to current position, where further the aircraft have triangles on their wing tips that change based on altitude (e.g. a descending aircraft has the triangles 70 applied to the wing tips in Figure 3), where if the aircraft ascend the triangles point up, etc. Clearly, Hancock could be read to suggest changing the shape of the icon based on the altitude information.

However, Hancock fails to expressly teach changing the shape of the aircraft per se, while suggesting **tagging** the aircraft icon with a symbol that changes based on advisory warning, and attaching the triangles to indicate vertical trend directions.

However, Nowell clearly teaches that redundancy in coding a particular attribute is beneficial and that participants analyzing data found that redundant coding (color with another attribute(s)) was beneficial to the user in conveying a particular quantity (see for example section 5.1.2, page 55, 3 out of 4 coding schemes that were multi-variable were found to produce statistically similar results that were superior to the other single or one multi-variant results. Additionally, on page 54, Color&Size <= Color&Shape&Size <= Color&Shape, which were superior in time coding, as noted 5.1.2. See multi-point analysis via ANOVA in 5.1.3.1, page 57, group 1, mean time on left, 4 of five combination for single function redundant encoding for combinations found fastest; page 58, mean time analysis Figure 5.5 – color / shape fastest of two-factor NR coding; shape/color and other three-factor variants fasted on 3 of 6; Ease of Use with

shape combination coding found to be greatest in Figure 5.6, page 59; note again Figure 5.7, page 61, finally second paragraph page 74).

As a result, based on the teachings of Nowell in the above locations, it would have been optimal to utilize redundant coding (in the form of shape with color) to emphasize any given quantity in order to immediately convey it to users. **Nowell therefore teaches that it would be obvious to change the shape of the icon itself, not merely symbols on the edge of the icon**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Azuma to change the shape of an icon to present altitude information, since Hancock clearly teaches that redundant coding is a good idea so that the air traffic controller can more easily determine the altitude of an aircraft at a glance in a 2D plan view rather than a 3D perspective view, and so that the information is more accurately conveyed – visual redundancy does this. Also, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a change in shape of the icon to provide visual redundancy (since Azuma uses a monotonically varying, correlated quantity to determine icon hue, and since the shape is only being used to provide redundant information coding as specified in Hancock).

As to claim 13, this is a method version of claim 12, the rejection to which is incorporated by reference. The first coordinate x = latitude, the second coordinate y = latitude, and z = altitude with respect to mean sea level (e.g. a geographic reference). Azuma clearly shows a display – see Figures 1, 3, 4 that correlate the z coordinate with

color, and as provided by the combination with Nowell and Hancock above, shape, wherein the color / shape is indicative of the value in the third axis (altitude). Clearly, the icon has the (x, y) position of the first and second coordinates and has the shape / color representative of the recited altitude.

Azuma teaches a processor that converts that altitude information of the of the system to an icon that has changes color in response to the altitude information, e.g. page 34, upper right column, "Aircraft icons are colored based on direction and latitude. Eastbound aircraft are orange, and westbound aircraft are blue, with lighter hues indicating higher altitudes." Displaying the icon on the display, wherein the displayed icon has the shape that changes in response to changes in the third coordinate z, and where the displayed icon has a position on the display indicative of the first and second coordinates (*x, y*). (Azuma teaches display devices on page 34, lower left column, where such is obviously coupled to the display device since it displays the output. In Figures 3-4, the aircraft are represented as icons having the recited latitude and longitude positions, where the icon changes color in a manner indicative of the attitude of the aircraft. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Azuma to change the size of an icon to present altitude information, since Hancock clearly teaches that redundant coding is a good idea so that the air traffic controller can more easily determine the altitude of an aircraft at a glance in a 2D plan view rather than a 3D perspective view, and so that the information is more accurately conveyed – visual redundancy does this.

As to claim 26, Hancock teaches a limited number of discriminably different sizes (e.g. 3)(3:5-4:55).

As to claim 27, clearly Azuma teaches a continuously variable relationship between hue and altitude, and following that logic (if size is replaced for hue), then continuous variability would be obvious. Also, size is easier to discriminate than hue if the operator of such a system is under high cognitive workload (this is well known in the art), which provides the motivation for replacing hue with size. Also, Hancock clearly points out that size is preferred, given that Figures 1 and 2 illustrate variation and proximity by means of changing the size of an icon.

As to claims 28 and 29, the rejection to claim 14 above is incorporated by reference in its entirety. Azuma clearly teaches that a desired characteristic correlates with a higher value of the third coordinate – that is, the characteristic (grayscale, e.g. level of hue) changes monotonically with the value of the third coordinate (e.g. altitude). It would therefore have been obvious to one of ordinary skill in the art at the time the invention was made to vary such other characteristics as might be linked to the third coordinate in a similar manner. Nowell also teaches the triply redundant coding, as discussed in the Color&Size&Shape items above and as discussed in 5.1-5.4.3.

The only difference between claims 28 and 29 is that the altitude is correlated with either a smaller or larger size (e.g. the size changes in one direction or the other). The direction of shift (e.g. that the aircraft gets larger with increasing altitude, or vice versa) is obviously not critical (since applicant is claiming it is implemented in both directions), and applicant has demonstrated no criticality otherwise. Choosing which

direction the scaling would occur would therefore be a matter of user choice and/or preference. Therefore, since the direction of change is not important but rather the knowledge of what the change means (e.g. that lighter color is higher or lower, or that bigger is higher or lower) is the critical portion; it is matter of the user preference.

As to claim 39, clearly as noted above Hancock changes the size of the icon with respect to the altitude or changes in the third coordinate z, where the changed icon is updated on the display as discussed above.

As to claim 40, this is very similar to claim 39 except that the word 'color' was replace with 'size'. Azuma fails to teach this limitation expressly (although the change in hue of the icon as on page 34 in the upper right hand column could be regarded as a change in color), while Hancock clearly changes the color of the icon with respect to altitude as discussed in (Abstract, 2:30-47, 3:40-50) with the triply redundant coding and the like. Motivation is taken from the rejection to the parent claim.

As to claim 41, Azuma clearly changes varying the hue of the icon. Azuma clearly shows in Figures 3 and 4 various two- and three-dimensional views of icons. These icons are specified to change **hue** with altitude, that is: "...lighter hues indicating higher altitudes..." (Azuma page 34, right hand column, top paragraph). This clearly constitutes a monotonic change in intensity of an icon (since the lightness of a hue corresponds to grayscale and/or intensity change of an icon with respect to altitude). Again, see the rejections to the parent claim, wherein changing both the color (e.g. hue from Azuma) and shape (suggested by Hancock, fully explained by Nowell, in the rejection to the parent claim).

As to claim 42, this is a system claim999 comparable to the method equivalent in the rejection to claim 39 above, where that is incorporated by reference.

As to claim 43, this is a system claim comparable to the method equivalent in the rejection to claim 40 above, where that is incorporated by reference.

As to claim 44, this is a system claim comparable to the method equivalent in the rejection to claim 41 above, where that is incorporated by reference.

As to claim 5, this is a system claim comparable to the method equivalent in the rejection to claim 26 above, where that is incorporated by reference.

As to claim 6, this is a system claim comparable to the method equivalent in the rejection to claim 27 above, where that is incorporated by reference.

As to claims 7-8, these are system claims comparable to the method equivalents in the rejections to claims 28-29 above, where those are incorporated by reference.

As to claim 45, Azuma page 45 lists cockpit display for pilot, and Hancock discloses ADS-B system known to receive transponder information from other aircraft, wherein 2:10-47 clearly discloses how the system receives altitude information. Examiner takes Official Notice that it is well known that manned aircraft are required by regulatory agencies to have altimeter such that they are aware of own height. Therefore, it would be obvious that processor would receive data from own aircraft altimeter.

As to claim 46, Azuma teaches the ADS-B system where aircraft are interrogated on Mode-S transponders for TRACON systems, e.g. they broadcast their positions and

intended routes to other aircraft (upon interrogation)(via Mode-C and Mode-S required interoperability by FAA at time of filing of instant application, assuming Mode-S standardization by 2002 which was well-known in the industry and civil aviation interoperability per FAA documentation)(air traffic controllers obviously derive their information from radar – see page 34). Clearly the processor obtains altitude information from radar.

As to claim 47, method version of claim 45, rejection incorporated by reference in its entirety.

As to claim 48, method version of claim 46, rejection incorporated by reference in its entirety.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Woods whose telephone number is 571-272-7775. The examiner can normally be reached on M-F 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Eric Woods

April 23, 2007

ULKA J. CHAUHAN
PRIMARY EXAMINER